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ABSTRACT

These papers examine computer technology use in urban schools. "E-Rate Takes Hold, but Slowly" (Donna Harrington-Lueker) charts the progress of four urban school systems using E-rate funds to build powerful communication networks. "A Chicago Front-Runner Bypasses the Internet" (Alexander Russo) describes one school's commitment to educational technology despite operating at 200-percent capacity and serving disadvantaged students. "When Wiring Isn't Enough, a Middle School Hires Another Teacher-Trainer" (Pricilla Pardini) explains how one Milwaukee school developed such an intensive, sophisticated use of computer technology that it had to hire a full-time staff member to train teachers. "Old Problems Stymie East High, but a New Networking Academy Emerges" (Shari M. Sweeney) explains how Cleveland's aging public schools face many problems beyond acquainting students with keyboards, often relying on grants and corporate partners to fill their technology needs. "Detroit Hopes Laptops and Bond Money Will Jump-Start Technology" (Peggy Walsh-Sarnecki); describes the limited access to computers in Detroit's schools, noting how the 1994 approval of a $1.5 billion bond issue for capital improvements such as technology upgrades has not been thoroughly utilized and describing the use of state money to buy 90,000 laptop computers for use by every public school teacher in Michigan. (SM)

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SPECIAL REPORT

ED 456 188

New Networks OLD PROBLEMS

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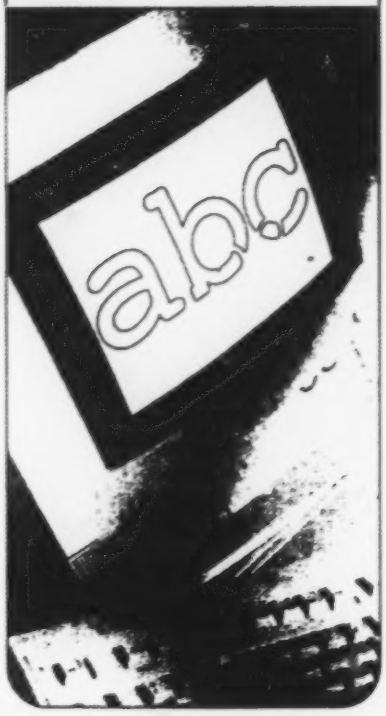
E-RATE takes hold, but SLOWLY

By Donna Harrington-Lueker



Two years after receiving their first round of E-rate funds, school officials in Chicago, Milwaukee, Detroit and Cleveland have found that building a multimillion-dollar computer network may be easier than helping schools learn to use that technology well.

That's one of the lessons to emerge from interviews with administrators, teachers, and technology researchers about the current uses of technology in the districts and from visits to the districts' schools.

It also comes as the Federal Communications Commission prepares to award $2.25 billion to wire the nation's schools, bringing the total funds awarded to $8 billion. The largest share of those funds, which cover telephone service, Internet access, and internal network connections, has gone to high-poverty districts.

For the four cities in this study, E-rate funding has been a boon. In the first year of the program, Chicago, Milwaukee, and Cleveland were among the top four recipients of E-rate funds nationwide. And Detroit, which lagged behind the others in its requests for funds, asked for $68.4 million this year. That's more than the district received in the three prior rounds of funding combined.

The districts have used those E-rate funds to build powerful telecommunications networks that rival or exceed those in more affluent suburban districts, but most only have begun to address transforming those investments into gains in teaching and learning.

The cost of updating electrical systems, the need to train massive numbers of teachers, the presence of competing reforms and contradictory district mandates, the pressure of high-stakes assessments: All affect the way technology is – and isn't – used in schools in each of these cities.

A further complication: This year, the FCC received $5.2 billion in E-rate requests – more than twice the $2.25 billion available for distribution. Given that gap, in early May, the FCC proposed giving priority for funds for internal network connections to districts that did not receive such funding last year. That change could jeopardize the progress of all four districts in this study.

This report is a follow-up to EWA's *Barriers and Breakthroughs: Technology in Urban Schools* (1999). It charts both the progress the four school systems have made in the last two years and the challenges they face. To measure any differences in teaching and learning, this report also profiles four schools that reporters first visited in 1998-1999.

World-class Networks

At the district level, the most obvious signs of progress are the new high-speed networks that crisscross the school systems.

Only two of Cleveland's 118 schools had Internet access at the time of EWA's first technology report. Today, after three waves of E-rate funding totaling $74 million, the school system has built a web of high-speed connections that allows the transmission of voice, video and data to all schools.

With the exception of rooms in a few older schools recently reopened, every classroom in the district is wired for the Internet, says Frank Detardo, Cleveland's director of instructional technology.

This compares to 60 percent of classrooms in high-poverty districts nationwide in the year 2000, according to the National Center for Education Statistics, and 82 percent of classrooms in districts with the lowest levels of poverty.

Only 38 percent of classrooms in high-poverty districts were connected to the Internet in 1998, the year before receipt of the first E-rate funds, and 57 percent were wired in more affluent districts.

Reporting the E-rate – Tips for Reporters

One place to start a story on a school system's use of federal E-rate funds is with FCC Form 471. The form is filed with the Schools and Libraries Division (SLD) of the Universal Service Administration Company, the private group that administers the E- rate program for the FCC. And it describes the district's current technology capacity, including the number of computers a district has, the number of telephones, and the number and speed of Internet connections.

Of more interest to reporters, the forms contain a list of the services the districts have ordered — wireless networks, network maintenance, T1 lines — and the names of the vendors supplying those services. The districts also must list the cost of services ordered on the form.

For this study, EWA initially asked the SLD for copies of the 471 forms for each of the four districts for each of three funding periods. The SLD declined to release the forms, saying that the information was not easily accessible and that the forms contained proprietary information. EWA then filed a federal Freedom of Information Act request with the FCC, which released the forms in their entirety.

Among the findings from the forms:

- One of the biggest recipients of E-rate funds is Ameritech, one of the regional Bell operating companies, which has secured multi-million dollar contracts in all four districts in all three funding periods to date. Some of the company's largest commitments were in Chicago, where, in Year 2, the district contracted with the company for a $3.1 million "Ameritech managed private WAN [wide area network] . . . for one year," another $2.3 million in Centrex telephone charges for schools, and other services.
- The cost for maintaining the new telecommunications technology can be substantial and ongoing. According to its 471 form for Year 1, Chicago contracted with CAL Communications, a minority-owned business in Buffalo Grove, Ill., to provide maintenance for its telecommunications system (including providing telephone service to all schools, maintaining telephone lines, and dealing with telephone rentals) at a cost of $1.1 million. Cleveland applied for $564,000 for a maintenance contract for the wiring of all its schools and $4.3 million to maintain routers and switches.
- In addition to routers and servers, the districts have also used E-rate funds for long-distance charges, cellular phones, and pagers.

One caveat: The forms are lengthy, and the FCC's duplicating costs add up. Ask the district first.

Reporters may also want to track Item 25 Review documents. These reviews are part of the SLD's oversight of the E-rate program and are made when the agency may have reason to question whether a district is complying with program regulations.

EWA asked the FCC for any Item 25 documents involving any of the four districts, but the FCC denied this request, citing FOIA exemption 7, which protects from disclosure "records or information compiled for law enforcement purposes." Releasing those records would disclose the techniques the SLD uses for investigations and compromise the integrity of the program, the agency said.

The FCC would not confirm whether any of the districts had been subject to such a review.

EWA is appealing the decision.

Milwaukee has made similar gains. Before E-rate, most schools in the city had dial-up Internet access, and only one-fifth of the district's 5,000 classrooms had Internet connections. "I'd be constantly saying, 'If we could go on the Internet, this is what we'd see,'" says James Furness, technology coordinator at Westside Academy I and II.

As of spring 2001, Milwaukee had connected all schools to a districtwide network of high-speed lines and fiber-optic cable. Sixty-five percent of its classrooms also had been connected, and district officials say they expect to have all classrooms online in the next 18 months.

Gains have been slower in Chicago and Detroit. Thanks to E-rate funds, nearly half of Chicago's 600-plus schools now have T1 lines, says Chanda Davis, the district's E-rate project manager. In 1999, only 63 schools had such access. In addition, about 40 percent of the city's classrooms are connected to the Internet, including every classroom at the high school level. Still, about a third of Chicago's schools are "flatliners" with no Internet connections at all, says Davis. These schools will be given priority in the 2001- 2002 school year.

Schools that had Internet connections or schoolwide networks have faced obstacles. According to Davis, some schools with networks in place before E-rate had to redo their lines to meet new district standards. Others had to reconfigure newly installed networks because inexperienced principals had no way of judging a contractor's work early in the E-rate program, Davis says.

But Chicago's size has been the biggest challenge. "Very few organizations in the world have more than 640 sites to deal with," says Davis.

Though smaller, Detroit also has made slower progress. As of spring 2001, the district had provided all its high schools and nearly all its middle schools with T1 lines. But less than half of the district's elementary schools have

such connections, says Thomas Diggs, the district's technology director. At the same time, Diggs says it's unclear how many of the district's 8,800 classrooms are wired for the Internet.

All four districts have spent millions in local funds to upgrade electrical systems that can't support computers, printers and other peripherals. E-rate funds cover network connections within schools, but not electrical upgrades.

With some buildings more than 100 years old, Chicago has committed $199 million to bringing the electrical systems in half its schools up to the minimum requirements specified in the E-rate, the district's office of operations reports. Those funds have come from a $2.6 billion capital improvement program the district began in 1996. Another 200 schools are targeted for electrical upgrades in 2001-2002.

But even with the capital improvement funds, the district has had to scale back its initial plans. According to Davis, 10 rooms in each Chicago elementary school were wired for network connections in early rounds of E-rate funding. But next year the district can only fund electrical upgrades for three rooms in each school, Davis says.

In Milwaukee, technology director Bob Nelson estimates that one-third of the schools require upgrades to support the increased demand for electricity at a total cost of $31 million.

Districts have found, too, that powerful networks can stall when classrooms lack sufficient hardware. Thanks to Ohio's SchoolNet program, which has targeted elementary schools throughout the state, Cleveland's elementary schools have between four and five computers in most classrooms. But hardware is less plentiful in the district's middle and high schools, say teachers and technology specialists familiar with the district.

Lack of hardware has limited what teachers can do with the district's high-speed network. "It's a great leash, but there's no dog," says Shane McConnell, chair of the English department at Cleveland's East Technical High School.

Online Content

As the four districts put new technologies in place, other trends are emerging. For the first time, most of the districts have begun to provide online resources such as encyclopedias and information databases via districtwide networks. With more schools — and more teachers — having access to the Internet, the districts also have put local and state learning standards, sample lesson plans, and advice on integrating technology into the classroom on line.

In each district, too, there are efforts to spur schools to use the new technology for Web-based projects that incorporate critical thinking and high academic standards.

Chicago has invested more than $1 million in developing a suite of Web-based tools that teachers use to create projects students use online. The tools are part of the district's Technology Infusion Planning program, or TIP, an effort to train teachers to better use the Internet. The program currently reaches more than 200 Chicago teachers.

The projects, which address specific district learning standards, vary by grade and subject. A third-grade unit on the solar system asks students to select a planet and then create an online brochure that would persuade someone to become a colonist. To complete the assignment, students consult Web sites for information about the sizes of the planets, their distance from the Sun, their geography, and their natural resources. Once students have collected information, they post what they've learned on line.

Another project on global warming asks seventh- and eighth-grade students to use Palm Pilots equipped with probes to collect air temperatures in the schoolyard. Students then enter their data into graphing software and compare their findings with real-world data on global temperature shifts.

The goal in each project is to encourage students to investigate a topic on their own, using unique resources available on the Web, and to encourage teachers to look differently at the content of lessons and the way they assess their students' work.

Bernard Bradley, a science teacher and technology coordinator at Newberry Academy, a K-8 public school on Chicago's near North Side, exploits just such resources in his global warming unit. A mentor for the TIP program, Bradley contacted a number of scientists via e-mail, asking the researchers if they would provide copies of their data for his students to use. All agreed, and that data became the core of Bradley's unit.

This year, the teacher has developed a similar project involving the effect of various environmental factors on the development of frog eggs.

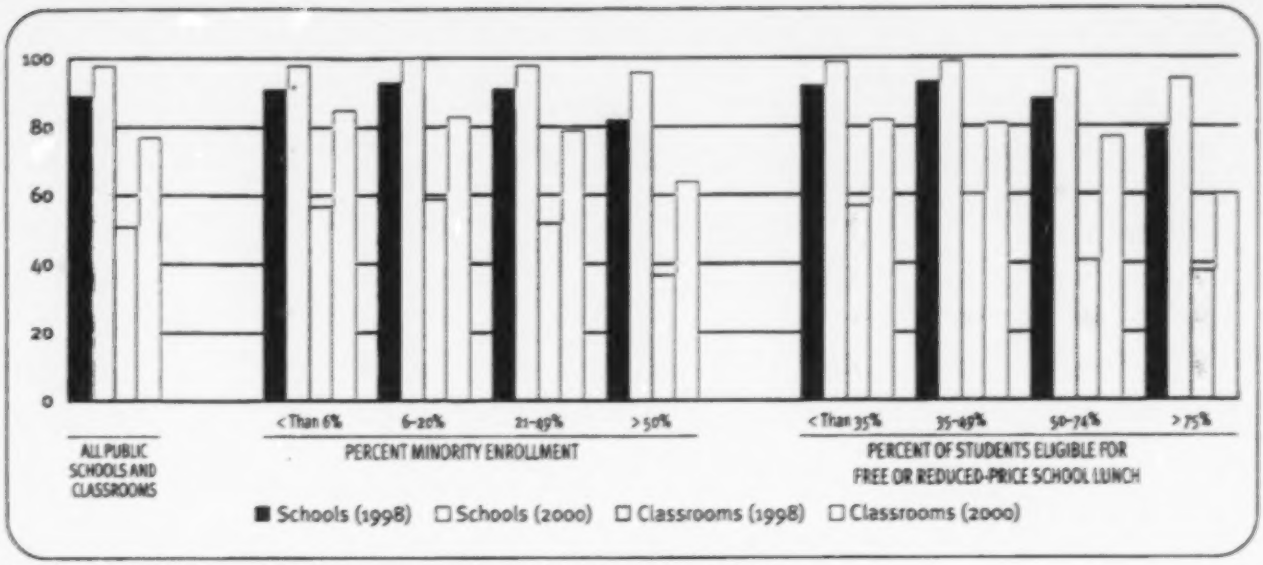
In both units, he emphasizes inquiry and exploration rather than lecture. "The kids just come into the lab and go to work," the teacher says. Working in groups, students have access to 16 iMacs, all connected to a T1 line, and to four iBooks with accompanying sets of lab probes.

With new networks capable of transmitting audio and video as well as data, the districts also are developing curricula that use videoconferencing.

Currently, six Cleveland middle schools are working with the Ohio Consortium for Conceptual Learning (OCCL), which has received $6 million from the state to develop units that target specific Ohio learning proficiencies. Schools in Akron, Columbus and Cincinnati also are involved.

The Cleveland schools are piloting an eight-week unit on fitness and nutrition that connects students with doctors and medical researchers at teaching hospitals in the area. Next year, 41 new schools will join the statewide consortium, including 18 Cleveland high schools, says Geoff Andrews, the OCCL's director.

At the same time, schools in each district are also using their networks to deliver programs that target basic skills. Nine schools in Cleveland are working with CompassLearning, a commercial program that covers the basic math and literacy skills students need to do well on Ohio's proficiency exam. Sixth-graders in the pilot schools use the soft-



Percentage of Schools and Classrooms Connected to the Internet, 1998 and 2000

ware for between 120 and 160 minutes a week. In Chicago, 14 schools are piloting Fast ForWord, a networked reading program.

Still others acknowledge that in the face of pressures to improve test scores, they've simply put technology on the back burner. "Books are just more important," says Bruce Allman, principal of Chicago's Eliza Chappell School. Eleven of Chappell's classrooms have been connected to the Internet as part of the district's ongoing capital improvement plan, but the connections were not something the preK-8 school had sought, says Allman. And the principal says he does not plan to increase the school's commitment to technology. Chappell already has a 36-station computer laboratory and a minimum of one computer in every classroom.

"We're still worried about reading and doing math at national norms," says Allman. Forty-nine percent of Chappell's students score at that norm in reading, and 67 percent do so in math.

Teacher Training

With considerable help from federal and private sources, the four districts are working on new strategies for providing professional development.

Cleveland is part of Alliance+, a Web-based program that helps teachers use Internet resources in the classroom. Funded by the U.S. Department of Education's Technology Literacy Challenge Fund, Alliance includes 10 weeks of workshops geared to a teacher's grade level (elementary, middle, or high school), with each workshop addressing progressively more difficult applications of the Internet.

Elementary teachers begin with an introduction to the World Wide Web and to the idea of using telecommunications technology in hands-on science classes. During that introductory lesson, they also link to the Science Learning Network, an online community funded by the National Science Foundation, and to schools across the country that are involved in projects that require the sharing of data. Still other Web links take teachers to museums, including San Francisco's Exploratorium, where archived Webcasts provide access to portable laser light shows and fiber-optic sculptures.

In subsequent weeks, teachers learn to set up an e-mail account on Yahoo and investigate Web sites such as the Volcano World or the Rainforest Connection. (The former is supported by NASA; the latter by the Smithsonian Institution.) Other workshops discuss how to incorporate real-time Internet resources, such as databases with updated sea-surface temperatures, into lesson plans.

In the third year of a five-year grant, Alliance has trained 820 Cleveland teachers, most of them at the elementary school level. A separate grant from the Joyce Foundation provides an additional 30 hours of training for middle school teachers.

Federal funds have driven professional development efforts in Milwaukee. With $4 million from the Department of Education's Technology Literacy Challenge Fund, the district worked with Marquette University to develop a three-credit online graduate course on integrating technology into the curriculum. According to district officials, more than 450 teachers have completed the course.

The district also received $1.9 million from the federal government's Preparing Tomorrow's Teachers, or PT3, program, which targets students in teacher preparation programs. As part of that grant, Milwaukee is developing a video library of best classroom practices that can be delivered over the Internet and is pairing student teachers with tech-savvy teachers. The district is also working closely with faculty members in schools of education.

To help teachers learn to use technology, Milwaukee schools also have used Title I funds to hire technology specialists.

But while teacher training is critical, it's also time-intensive. "It's like a graduate course in educational measurement or disruptive behavior," says Jonathan Fairman, a high school English teacher and school technology coordinator who works with the Alliance program. "You'll do six hours of homework for every three hours of coursework."

And even that commitment might not be enough. A preliminary evaluation of the Alliance program by researchers at Kent State University showed that teachers with 30 hours of training didn't use computers more frequently than teachers with no training. Teachers who had received 60 hours of training, plus other supports, reported more frequent use of computers in the classroom.

Ongoing help at the school site is essential as well, says Jim Sweet, Chicago's director of online learning. "We assumed initially that once teachers had the connection and some basic skills, they'd use the technology, but that wasn't the case," says Sweet, who came to Chicago from the National Center for Supercomputing Applications (NCSA) at the University of Illinois-Urbana.

"When you look at the research on innovation and effective instruction, the answer always is tools, training, and follow-up," Sweet says. As part of the TIP program, a cadre of seven experienced technology-using teachers visit participating schools regularly to coach other teachers and help them refine the online lessons they've developed for the program.

Even then, Sweet acknowledges, not all teachers complete their lessons, and not all lessons make the most effective use of technology. Further, the seven mentors can only reach a small number of Chicago teachers.

Making Technology Count

Other challenges remain. Central offices in each of the districts continue to define the role they must play in deploying and maintaining school technology. Detroit has hired a private firm to oversee technology services the district previously provided, including computer repair and maintenance. And Chicago has developed a purchasing program that takes advantage of the district's ability to buy in bulk and offers computers to school at reduced rates from designated vendors. But schools still report friction over the central office's need to standardize hardware and network connections and their need for flexibility to grow their own programs. Milwaukee, too, is piloting an innovative technology advisory board comprised of technology experts from across the nation.

A number of lighthouse schools whose principals have proven themselves adept at leveraging school funds and writing grants also continue to rocket ahead of other schools, accumulating even more resources than they had two years ago.

But such progress often demands persistence. "I'm usually a little hard to turn down," says Linda Pierzchalski, principal of Chicago's William J. Bogan Computer Technical High School, chosen this year by a national magazine as one of the nation's most-wired schools.

Bogan, which has a poverty rate of about 83 percent, received $600,000 in year two of the E-rate program, and Pierzchalski says that the funding moved the school forward quickly with its network. (Before E-rate, the school relied extensively on Title I funds for its technology program and had to deploy its use of technology in stages.)

Another of Pierzchalski's strategies: agreeing to become a test site for various technology programs. "My middle name is pilot," the principal says. "I simply tell people: You can try it here, but we're not paying for it."

But effective technology leadership remains elusive in many urban schools, advocates and others say.

Districts and schools struggle with the technical demands of maintaining sophisticated high-speed networks, a task that is much more complex than keeping a stand-alone computer running or fixing a printer that has jammed. In most of these districts, the job of keeping the network running falls to school-level technology coordinators or technology teachers, virtually none of whom are network specialists.

The job can be both time-consuming and frustrating. One Chicago principal notes that his technology coordinator — a teacher with a master's degree in instructional technology — has become "an electronic janitor" who spends her time keeping the servers running.

A technology coordinator at a Milwaukee middle school reports the same pressure. "It's not as much fun as it used to be," she says. "I spend a lot of time alone in a noisy, hot little room and less time with teachers."

Perhaps most tellingly, while the access to technology has increased in each of the districts, so have competing pressures. State accountability tests, an array of reform initiatives, the fear of being put on a warning list, can all push technology onto the back burner.

Combating skepticism about yet another reform is a challenge. "Teachers and administrators don't really believe that technology is the answer to their problems," says Elliot Soloway, a University of Michigan researcher who has worked in Detroit and other urban systems.

But until they do, the billion-dollar networks E-rate has put in place are in danger of becoming the latest, and perhaps most expensive, unused instructional technology to be put in schools.

Donna Harrington-Lueker is a freelance education writer and an assistant professor of journalism at Salve Regina University in Newport, R.I.

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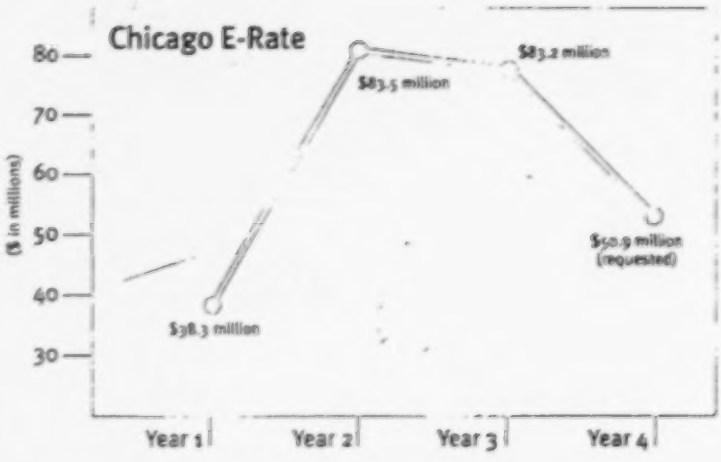
A Chicago Front-Runner BYPASSES the Internet

By Alexander Russo



The past three years have brought several key changes to James Shields Elementary School. Student enrollment has increased by almost 500 students. While an annex to the main building was supposed to handle the overflow, a shuttered parochial school now has been leased three blocks away to house extra students. And thanks to E-rate and local funding, Internet connections and multimedia computers are now available in many classrooms and labs.

What hasn't changed is the school's commitment to education technology. In Chicago, Shields remains known for its carefully developed technology program and admirable student achievement increases, despite operating at 200 percent capacity and serving a disadvantaged population.

In an intensive effort to help students who are lagging in reading despite schoolwide improvements, Shields has implemented Fast ForWord, a computer-based word and sound recognition program, and has targeted roughly 200 students so far. For almost two hours each day, four days a week, selected groups of Shields students are taken out of class to work at computer monitors displaying lively cartoon graphics. The labs are eerily quiet, and the only sounds in the room are muffled chirps and bells coming out of the students' headsets or the occasional instruction from the monitor to move on to the next "game." Teachers and administrators alike say the program is an effective way to help struggling students understand different vowel sounds and "rewire" the way they hear and read.

"It really helps with kids who are not sure about sounds," says bilingual first-grade teacher Lydia Arriaga, who has had several students go through the eight-week program.

A "Super-Sized" Elementary School

Nearly everything about Shields is big, even by Chicago standards. Located in the working-class neighborhood of Brighton Park, Shields is the largest elementary school in the district. There are more than 2,200 students in prekindergarten through eighth grade and roughly 100 teachers. Shields has 10 first-grade classrooms, and an average class size of 35. More than 95 percent of the students come from low-income families, and just under 94 percent are Hispanic.

Even the technology program is massive. Led by principal Rita Gardner and technology coordinator Rita Shuble, Shields has been growing its technology program for almost a decade. Using a local area network and its own servers, the school has close to 100 computer programs, including reading, math and social studies, available to every classroom in the school. All four of its computer labs now have Internet access, as do classrooms in the newer annex and on the third floor of the main building. As of the end of 2000-2001, roughly 60 percent of the classrooms had Internet access, according to Shuble. There are more than 380 instructional computers in the school, including 32 laptops used at the branch building. While many are older units with no hard drives, more than half are now multimedia units, Shuble says. Each classroom is equipped with six computers on average. Large-screen televisions can be used as monitors in labs and some classrooms.

Reaching Struggling Students

The commitment to try Fast ForWord was the result of the realiza-

tion that student test scores, which had risen steeply at Shields during most of the 1990s, were flattening out. About a third of all Shields students scored at or above national averages in reading in 2000, and just under 45 percent of all students scored at or above national averages in math.

Shields is one of 14 Chicago schools using Fast ForWord, a program developed by Berkeley, Calif.-based Scientific Learning. Shields piloted the program in 1999 with Chicago Public School funds and is one of the only schools using the program with mainstream classroom students rather than students in special education programs. For this program and other innovations, the school has been visited by researchers from as far away as Japan and singled out by former schools chief Paul Vallas as an innovator when it comes to education technology.

Fast ForWord costs the school about $30,000 a year in licensing fees. Additional costs include telecommunications fees, electricity and salaries for lab monitors. The labs also had to be wired to the Internet.

The impact of the program on the first set of participants was evaluated by the school, which found improvements in attention and participation, and especially marked gains for limited-English students. While these additional improvements can't be credited solely to the computer program, the study gave Shields teachers and administrators confidence to move ahead, Shuble says.

From a high of 10 students held back in third grade the year before the program began, the number dropped to just one, due in large part to improved test scores among those who participated, according to Shuble.

Limited Use of the Internet

But for all of the technology in use at Shields, the Internet is not a large part of the program, even as access has spread from labs to classrooms in the main building. A first-year teacher checking her e-mail during lunch says that the most common use of the Internet in her class is to check the outside temperature. "If a teacher goes through four Internet projects a year, that's a lot," says Shuble. In fact, the main use of the Internet at Shields is to send and receive data from the company that runs Fast ForWord. Information is sent daily to California and then turned into individualized student reports that are printed out each week by the lab monitors.

Shuble says the limited Internet use has a lot to do with the relative difficulty of using Internet-based programs, which require additional steps to get started and careful monitoring to make sure that students haven't surfed off to another website. But unfamiliarity with the Internet is a factor, too. "Teachers tend to go back to the old software," says Shuble.

Another reason may be the abundance of software and information available on the school's local area network, including a program called NetVista that filters Internet access on all of the computers. Shuble can adjust the level of filtering, by word or particular site, according to the requests of teachers and by grade level.

She also asks teachers to preview sites and can limit access to a particular set of pre-screened sites. The school also uses Web Buddy in the satellite building to simulate the Internet for the three grade levels there.

Gardner and others at Shields support using the Internet sparingly, especially at the elementary level. "Even though we have Internet service," says Shuble, "most of the teachers prefer to use the network."

The reality is that students aren't using the computers all day. At Shields, most classroom teachers use computers to reinforce basic skills or for special projects such as researching the Chicago fire, ancient Egypt or the Holocaust. Younger children work on writing and illustrating their own books.

The only intensive, systematic exposure to computers occurs once each year during an eight-week block when students use the lab daily, says Shuble. During those blocks, students work on research projects, practice keyboard skills and work on skills related to their classroom instruction. Professional development is informal, conducted by coordinator Shuble or among the school's increasingly tech-savvy young teachers.

Challenges to Growth

Shields isn't without its challenges. The tremendous enrollment increase and the technological changes have created gaps in its program. The branch campus, serving kindergarten plus grades four and five, has no labs or Internet access, making for a two-year gap during key elementary years. There isn't much Spanish-language software either for limited English proficient students, who make up roughly a third of the school's first graders. And even at the main buildings, teachers in many classrooms have only limited use of instructional CD-ROMs, due to the age of the computers in their classrooms.

But teachers and administrators at Shields believe that technology isn't the answer to every problem. "The Internet is great for specific projects," says Shuble. "However, it has to comply with your frameworks and what you're teaching."

Alexander Russo is a freelance education writer in Chicago.

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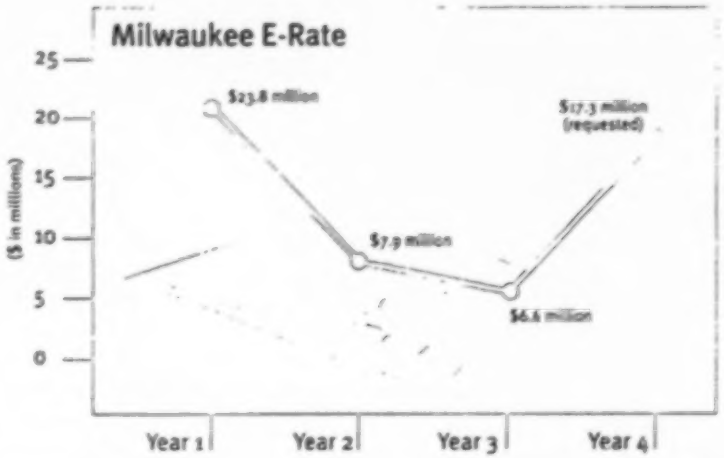
When Wiring Isn't Enough, a MIDDLE SCHOOL HIRES another Teacher-Trainer



BY PRISCILLA PARDINI

Seventh-graders at Milwaukee's Alexander Graham Bell Middle School no longer wonder if there will be more reds or browns in a package of M&Ms.

Thanks to a three-week unit on the scientific method in which students used spreadsheets and the Internet, the middle-schoolers know that the Mars Co., which makes M&Ms, packages the candy according to a specific formula.

"You're going to find more brown M&Ms than red, yellow or blues," says Samantha Shotwell, 13, who took part in the unit earlier this year.

Not all students at Bell use spreadsheets to analyze data or the Internet to visit corporate web sites. Anne Knackert, Bell's technology coordinator, estimates that only one-third of the school's 56 teachers regularly use technology in their classes. Many others struggle with electronic folders and documents, resist e-mail and rarely venture onto the World Wide Web.

Still, teachers who just two years ago had their students using computers as typewriters or learning fractions by playing electronic math games now seek out more meaningful ways to use technology in the classroom. In fact, since EWA's last report, Bell has hired a full-time staff member to help teachers do just that.

Technologically Strong

A racially diverse school, Bell enrolls 920 students in grades six through eight. Sixty-eight percent of the students qualify for free or reduced-price lunch, 18 percent for special education. One of the most popular middle schools in Milwaukee, it has long been a leader when it comes to technology. Deciding several years ago to use its Title I funds for technology, Bell was one of the first schools in the district to network its computers. It was named one of the district's first Replicable Schools, a cadre of schools selected to share their knowledge of technology with others.

Bell also garnered national recognition by being named in each of the last two years as one of the nation's Top 100 Wired Schools by Family PC magazine and the Princeton Review. This year, schools were selected based on how well teachers integrated technology into their teaching, and Bell scored points for having an integrative technology teacher, Ann Green, on staff.

The decision to hire Green, a former special education teacher pursuing a master's degree in educational computing, stemmed from the desire to increase the number of classroom teachers using technology in meaningful ways. With Knackert busy maintaining equipment, troubleshooting technical problems, attending meetings, writing grants and working with consultants, Green was brought on board to team teach with classroom teachers. She helps them design and teach lessons that have students doing Internet research, manipulating data and creating interactive projects. "To take the dive, the teachers needed someone holding their hand," Knackert says.

Today, Bell has nearly 500 computers, including 105 new iMacs, all Internet accessible via high-speed data lines and fully networked via fiber-optic and copper connections. There are five computers in every classroom, 25 in the library and 40 each in two labs. Eight centralized supercomputers give each computer in the building access to networked CD-ROMs such as the *World Book Encyclopedia*. An electronic library system provides resources such as the *Reader's Guide to Periodical Literature*. Also available online are diagnostic and

testing programs such as Accelerated Reader. Each of 85 printers can be accessed from any computer.

Multiple Sources of Funding

Bell's technology focus is the result of a long-term plan developed by members of its technology committee. The constantly evolving plan lays out schedules for equipment and software purchases and wiring projects, and outlines future staffing levels and staff development needs. It calls for setting up two wireless, networked, mobile computer labs, each equipped with 35 laptops, which will allow teachers to work with students in their regular classroom on projects begun in a computer lab. The plan also calls for a new unit on keyboarding for sixth-graders.

Bell used $124,349 in federal E-rate funds over the last two years to upgrade its wiring to meet district standards. Another $120,000 in state Replicable Schools money paid for 40 new iMacs, a videoconferencing lab and the servers.

Bell also seeks out private money, currently pursuing a $105,000 grant from the local Helen Bader Foundation. The grant would pay for the mobile computer labs and for SkillsTutor, a Web-based program that assesses student progress on a wide range of concepts and provides lessons to address areas of weakness. The program is aligned with state standardized tests.

Involving Teachers

Such tests loom large for Bell. In 1999-2000, just 16 percent of Bell students (and 2 percent of its African-American students) achieved proficiency on the state's standardized math test. Significantly more students — 78 percent — met district math proficiencies largely because teachers can re-teach lessons and re-test students. Still, Bell has a way to go to meet the district's target that 95 percent of all students will meet proficiency by the end of eighth grade.

Knackert is convinced that technology can help. In fact, she takes heart from the fact that test scores over the last three years have been increasing, albeit slowly. But Knackert believes that technology will only make a difference if teachers buy into its potential.

Enter Green, who works with classroom teachers bringing their students to one of Bell's 40-station iMac labs on a rotating basis. A class spends every other day for three weeks in the lab, with alternating days spent back in the classroom. Green helps teachers design lessons that incorporate technology and teaches the computer skills needed for the lesson.

When a science teacher told Green she wanted her students to learn about spreadsheets, Green suggested the M&Ms project. During the three-week unit, students formed hypotheses, designed procedures to test them, analyzed data and drew conclusions. For a unit on the Olympics, students researched the differences between modern and past Olympic Games. They also conducted e-mail interviews with a member of the U.S. women's swim team competing in Sydney, Australia. Green persuaded another science teacher to have his students, who were studying the periodic table of elements, create multimedia projects using HyperStudio rather than write traditional research papers — a simple use of computer technology.

Some days, Green's lessons are even more basic. Working recently with eighth-graders doing research from the electronic *World Book Encyclopedia*, Green had to remind the students to copy and save their information electronically rather than print it out. "This is exactly what I didn't want to see," she said in exasperation, holding aloft a stack of computer printouts.

Green longs for the day when computers are as easy for students to use as calculators, and she can spend her time focusing on content. Still, she and Knackert are encouraged. They note that technology skills are being taught in language arts, science and social studies, with Green providing the support and encouragement teachers need to teach with technology.

"Every class period there's something different going on," Knackert says. "That's exactly what should be happening – not cookie-cutter technology."

Priscilla Pardini is a freelance education writer in Milwaukee.

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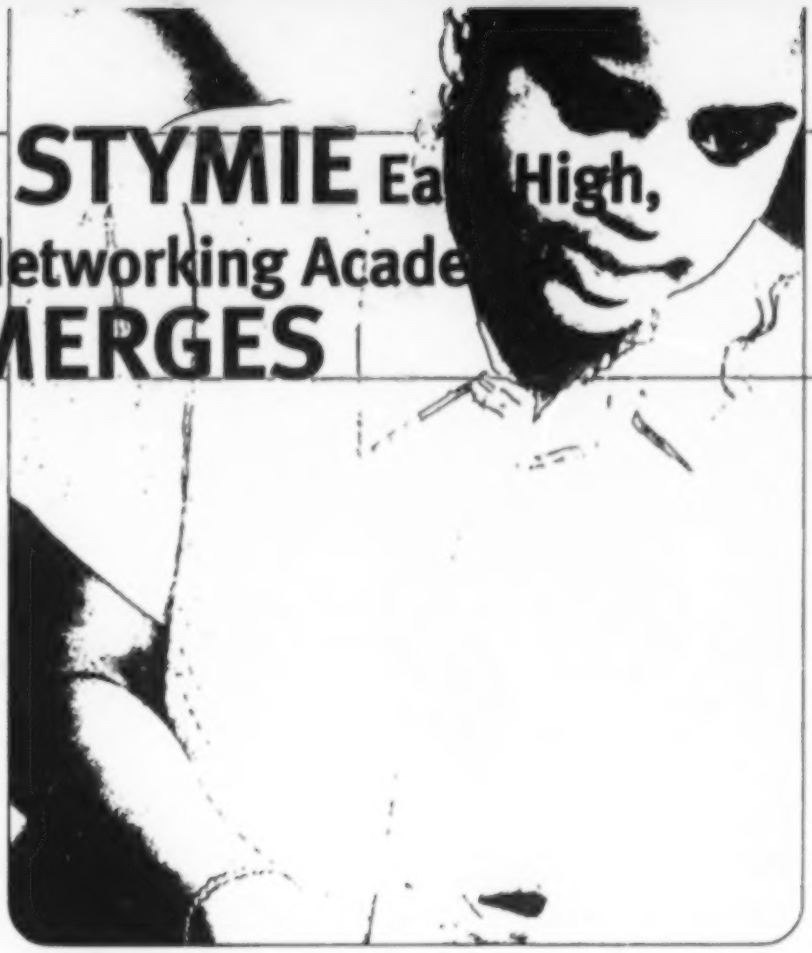
Old Problems STYMIE East High, But a New Networking Academy EMERGES



BY SHARI M. SWEENEY

Leonard Tabaj was in his classroom when the gym roof collapsed. It was early October 2000, just into the first semester of the Cisco Networking Academy, through which students learn the finer points of subnet masking and other network fundamentals.

Tabaj, head of the new academy and a 26-year veteran teacher with the Cleveland Municipal School District, was working alone when he heard — and felt — the deafening roar: "I thought it was an earthquake. But then I walked out the door . . . and saw the sky."

No one was hurt in the East High incident, but it gave district administrators a headache they didn't need. It also offers a dramatic illustration of how districts with aging facilities like Cleveland's face bigger challenges than simply acquainting kids with keyboards.

Assembling Parts of the Puzzle

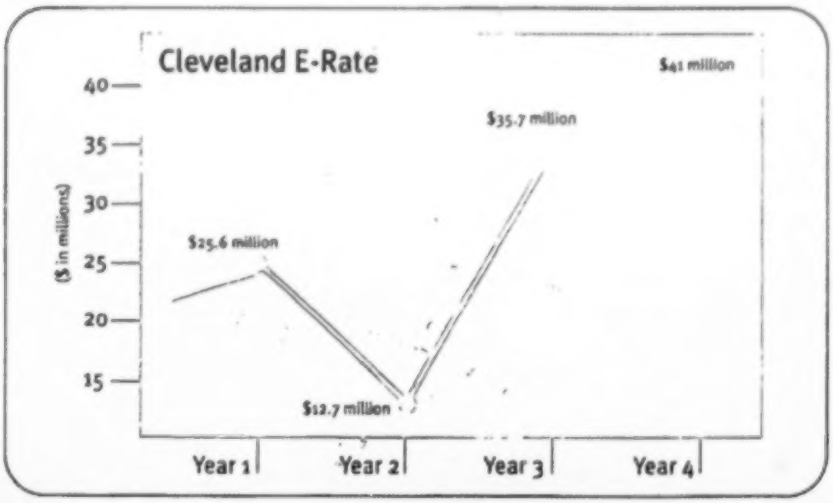
Many of Cleveland's public school buildings are showing their age: cracked plaster, water-damaged ceilings, missing and broken windows replaced with plywood. In May, city voters approved a $335 million bond issue to help rebuild and repair school buildings, making it possible for the district to qualify for another $500 million in state matching funds. Those renovations and repairs are expected to include installing or upgrading computer cables and providing Internet access.

This past February, too, 164 of Ohio's poorest public school districts were awarded almost $3.3 million in Ohio SchoolNet Commission technology equity grants, which must be used to cover technology-related expenses such as connectivity charges or software purchases.

But high schools do not qualify for SchoolNet funds, so schools like East, where nearly 60 percent of students qualify for free or reduced-price lunch, continue to rely on corporate partners, grants and sponsorships to fill many technology needs.

Frank Detardo, the district's director of instructional technology, can tick off lists of schools with computer labs, preferred software programs and staff training courses.

What he cannot say for certain is



how technology is used in a typical high school classroom — that is, if there were such a thing as a typical high school classroom.

"Some departments have taken to computer use more than others," Detardo says. "But the reality is that we don't have wide-scale computer [distribution] in our high schools."

While elementary and middle school teachers use PCs to track student progress and communicate via a local area network with colleagues, East High School and others like it have assembled part of the puzzle but are still searching for those last few pieces.

All Cleveland schools are now wired — in fact, most districts in the state have the ability, if not the equipment, to access the Internet and thus connect with other buildings and school administrators, although the extent of that access varies. One school may have data ports in 10 classrooms and another only in the library.

At East High, for example, the computer lab has a speedy T1 line while most other rooms have no online access at all. In the latter case, specific usage hasn't changed much in the past two years: More proactive teachers might adapt pages from the Internet for classroom use or set up class "pages," something like a web site but accessible only within the room or the school.

In one lab, called the Universal Lab, students still practice test skills, and special education students format and type recipes as part of their hospitality training program. But the lab now also offers Internet access for research as well as software programs that accompany the French and Spanish textbooks used in the language department.

Two years ago, East High School's technology initiatives were buoyed by corporate support and staff motivation. Cleveland-based bank KeyCorp provided PCs for the school's Universal Lab, and Rockwell Automation donated money and manpower for installation and wiring.

One science lab held a cache of castoffs, computers old and new that were repaired and rotated to classrooms as requested by teachers. At the time, there were more than 300 Windows-capable computers in the building for about 1,200 students. Some refurbished and donated PCs were used in the now-defunct Academy Tech program, in which students learned administrative skills like formatting business letters. Others were among the 25 networked workstations in East's Universal Lab.

About 14 of the computer lab's 486 PCs have been replaced, thanks to corporate donations, with Pentium-equipped computers. The lab has Internet access via a T1 line, although that access is heavily censored. Blocking software was installed districtwide to prevent students from visiting gambling or pornographic sites, or from participating in interactive sites such as chat rooms.

Teaching Networking Skills

Greg Grys, who runs the East High lab, says that sports sites were initially off-limits until math teachers pointed out that statistics are useful teaching tools.

Perhaps the most visible change came last year when networking giant Cisco Systems established regional networking academies in Cleveland.

East and Glenville were chosen as regional hubs, the first of 10 Cleveland high schools to host the two-year program, through which qualified juniors and seniors learn to design, build and maintain computer networks. The academy culminates in the Cisco certified network associate examination. With CCNA designation and a high school diploma, Tabaj says, students can vie for post-graduation jobs with salaries of $30,000 or more.

Cisco Systems contributes routers, switches, software, cables and first-year product support to its 6,000 networking academies worldwide. Cisco also provides the curriculum for the program, which is transmitted via the Internet.

The district provided 15 Pentium-equipped PCs, with another five donated by the world-renowned Cleveland Clinic. This summer, Tabaj and his Glenville counterpart, Daniel McMillian, will begin training colleagues at eight other Cleveland high schools interested in hosting an academy.

Tabaj teaches two groups of 20 students and already is mining for future candidates by reviewing tenth-graders' test scores and grade-point averages. Applicants must pass biology and mathematics courses, and all state proficiency exams.

Students gain experience through the hands-on coursework on such areas as IP addressing and switching theory, and in some cases help maintain equipment elsewhere in the building if union rules allow it. Tabaj is working, too, on setting up internships with local companies.

The roof collapse and school closure threw him for a loop, though. Well into the second semester, Tabaj was still retrofitting the cafeteria tables he received instead of the computer desks he'd requested — he wants power strips attached to tables and the floor cleared of cables.

But he is optimistic. Perhaps it was a sign that though the academy shares a wall with the damaged gym, the classroom itself was unharmed.

Picking his way through a crowded hallway, Tabaj points out the blue cables that snake along the floor waiting for workers on ladders to thread them beneath the acoustic ceiling tiles.

"When my students are certified," he says, "these guys will be working for them."

Shari Sweeney is a freelance writer based in Cleveland.

Detroit hopes LAPTOPS and BOND MONEY will JUMP-START technology

By Peggy Walsh-Sarnecki

When school media specialist Antoinette Durden began working at Detroit's Martin Luther King Jr. Senior High School in 1999, the school's library had a handful of computers, and only two of those had Internet access.

Today, the library has 10 computers, all connected to the Internet.

Throughout the day, the computers are busy being used by classes or individual students dropping in to work on a paper or project.

Compared to where it was in 1999, the Detroit Public Schools has made some strides towards improving technology access. But these haven't exactly been giant steps.

Martin Luther King Jr. Senior High School is one of the district's three "examination schools." In other words, King students have to score well on an entrance exam to be admitted. As such, they are among the district's brightest, hailing from all over the city. At the same time, nearly 53 percent of those who attend King also qualify for free- and reduced-price lunch — a number many say would be higher if high school students were less reluctant to enroll in the program.

Limited Access

But even at one of the city's top schools — where most, if not all, students plan to attend college — there are barriers to computer literacy. King's 10 library computers are the only ones available for students to use for writing or research. The school's 90 other computers are designated for office use or specific classes. This means students get little computer time for their schoolwork, even less to practice their computer and Internet skills. Detroit schools simply haven't been able to upgrade wiring and school buildings, or buy and maintain computers at a faster rate.

Teachers can't make assignments giving students work on computers at home either, since only about a third of King's students would be able to do so, says Janet Bobby, head of King's English department. That number is probably a higher percentage of students than at most Detroit high schools, Bobby says.

Even more frustrating is that it hasn't been the lack of money that has stopped capital improvements like technology upgrades. Detroit voters approved a $1.5 billion bond issue in 1994.

By 1999, only about $100 million of the bond had been spent, mostly on planning that was continually revamped by the school board or the series of constantly changing superintendents. Almost none had been spent on new school buildings, repairs or technology, as voters intended.

In 1999, Michigan passed legislation, popularly known as the Detroit school takeover bill, that changed the way the district was governed. Instead of an elected school board, Detroit now has a board whose members are appointed by the mayor and the state superintendent of schools.

Changing the school board was seen as a way of shaking loose the inertia that had plagued reform efforts for the past decade.

To speed up reform, the law also made the superintendent, now called a chief executive officer, a kind of school czar with the power to make all decisions without the school board's approval.

Kenneth Burnley, the new CEO, took office in July 2000. Showing the public specific results from the bond money is critical to Burnley's winning public confidence. This means there is a huge incentive for the new administration to make good on promises about the bond, including the plans for technology.

Building a New System

This year, in February 2001, the school district announced the first of the plans for spending the bond money, including about $150 million that will be earmarked for technology. The plan calls for every Detroit classroom to have at least five computers, all capable of being networked, and each school will be wired for voice, video and digital capabilities, says Robert Francis, the district's executive director in charge of the bond program.

The goal is to build a system that can be expanded or revised, a critical issue when working with antiquated wiring

and buildings, Francis says. The average Detroit school building is 63 years old.

Between the bond and the E-rate money, the school system expects to spend about $250 million over five years on technology. That includes $150 million of the bond money, plus an estimated (and hoped for) $100 million in E-rate money.

"I'm not sure you can do it any more rapidly than that and still execute well," Francis says.

This year DPS submitted two E-rate proposals for a total of $68.4 million: one for about $45.5 million for schools with poverty rates of 90 percent or more and the rest for schools with lower poverty.

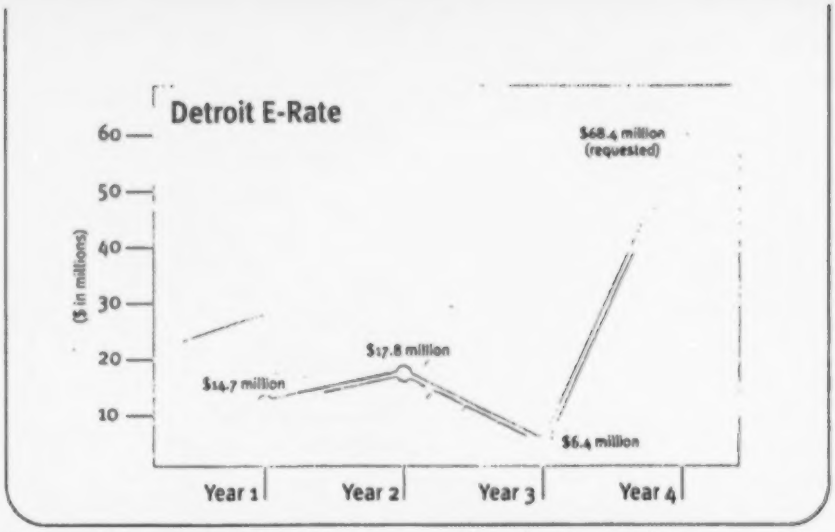
Realistically, however, given price increases, changes in technology, and unexpected problems caused by the age of the buildings, it could take another $100 million to complete all the technology Detroit schools need, says Robert Moore, senior deputy CEO for operations. That's a total of $350 million. A looming $72 million deficit in the 2001-2002 budget could put a monkey wrench in those plans, though.

Servicing the computers and networks in the schools also looms large. "If they're used all at the same time, it causes them to freeze up," said Alicea Jones, 18, a King senior who was writing an English assignment on a library computer. "And they're kind of slow."

Durden, the school's media specialist, agrees there are problems.

"I'm not sure everything was completed as planned," Durden says of the recent upgrades. Nor is it easy to get service when something does go wrong. "Getting technical support is a major, major problem here," Durden says. "Just trying to get things fixed around here may not happen."

Until this year, the district has had a technical support staff of about 14 for all of Detroit's 263 schools, says Thomas Diggs, the district's technology director. But that, too, is scheduled to change. In March 2001, the school district signed a five-year, $75 million contract with computer giant Compuware Corp., to outsource technical support and maintenance to the Detroit-based company.



School officials say they expect a company the size of Compuware will have enough personnel to finally provide adequate service to the schools. Specifically, the district will have minimum levels of personnel, including 23 service personnel for applications, 10 for audiovisual and 21 for field services. An additional 11 employees will be assigned to the help desk.

Laptops and Teacher Training

Like other districts, too, Detroit struggles with the problem of getting the teachers to use technology effectively in the classroom.

For that reason, one of the most promising technology innovations for Detroit and Michigan's other school districts is actually coming out of the state capital in Lansing. Gov. John Engler is spending about $110 million in state school aid to buy 90,000 laptop computers for every public school teacher in Michigan.

Teachers will be able to take their laptops home, keep them over the summer and use them inside and outside the classrooms. This will increase their familiarity with the world on the Web and make them more comfortable using computers, says Bobby, the Martin Luther King Jr. Senior High teacher.

Participation in the teacher laptop program is optional for Michigan's teachers. But most districts are expected to take advantage of the program. All full-time certified teachers who provide classroom instruction are eligible.

The biggest benefit from this program could be the opportunity for teachers to become more adept at integrating technology into the curriculum.

In Detroit's schools, 37 percent of teachers and 74 percent of school administrators are eligible for retirement. Most are old enough to remember typewriters. According to Bobby, these veteran teachers came to computer use late in their careers, and many are not comfortable enough with technology to make the best use of these new tools.

Bobby says she was "shocked" recently when a French teacher confessed to being unable to plan a trip to Paris using the Internet.

"A lot of them think they're going to do grades and attendance on [their laptops]," says Bobby. "They have no idea how to integrate the curriculum with computers."

King was only planning a half-day of training for teachers and their new laptops. And that session was scheduled for the end of the school year, when teachers had little time to use what they learned before the summer break.

But like Detroit's plans for spending $250 million on technology, it's a start.

"It's a question of using the Internet," Bobby said. "I can remember back when I first started, I didn't know what I was doing."

Peggy Walsh-Sarnecki is an education reporter with the Detroit Free Press.

Resources

Center for Research on Information Technology and Organization (CRITO). "Computer Technology and Instructional Reform." www.crito.uci.edu/tlc/html/tlc_home.html This site distributes information from Teaching, Learning and Computing, a comprehensive national survey of teachers and their use of computers. Recent reports, available as downloadable PDF files, include data on the availability of technical support in schools, leadership and technology, and the link between so-called constructivist teaching practices and technology use in the classroom.

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New Networks OLD PROBLEMS

The E-rate has been a boon for urban school districts. But are schools using the new high-speed networks in ways that make a difference in student achievement? *See inside for the full report.*

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